MEDICAL PROCEEDINGS

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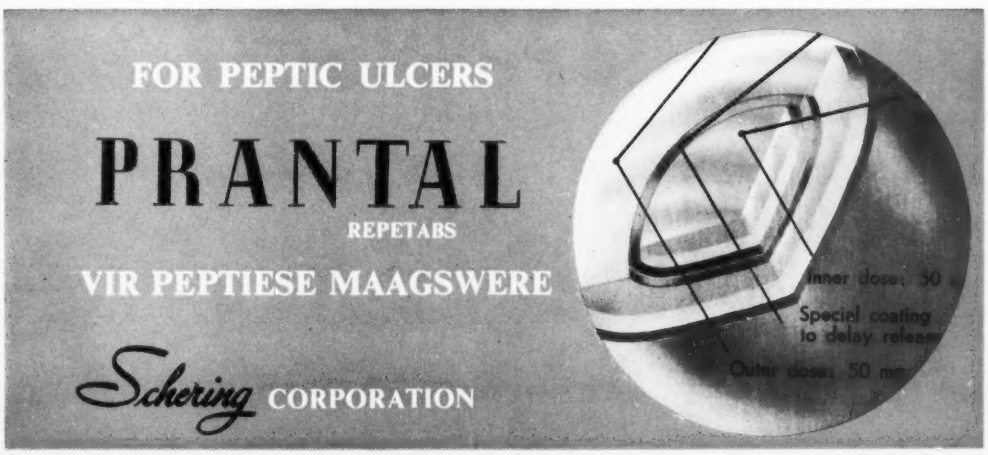
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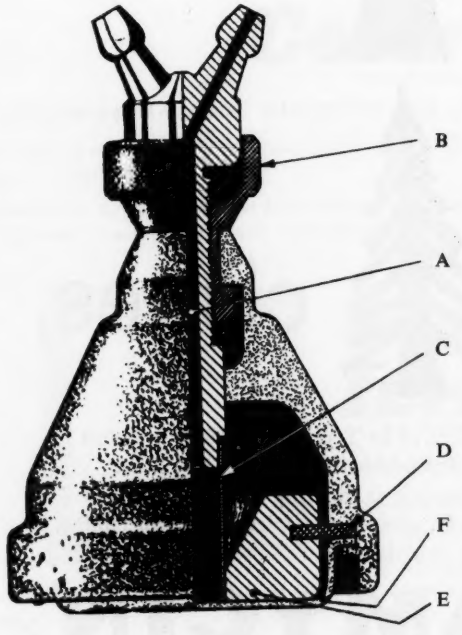
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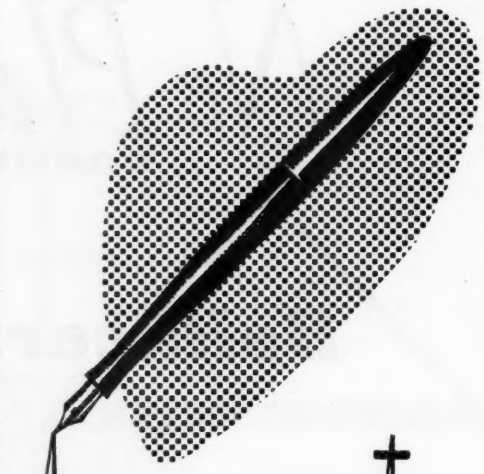
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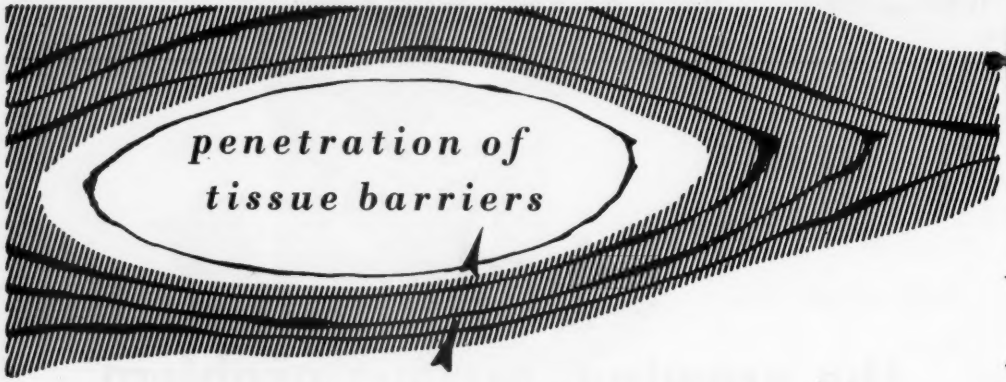
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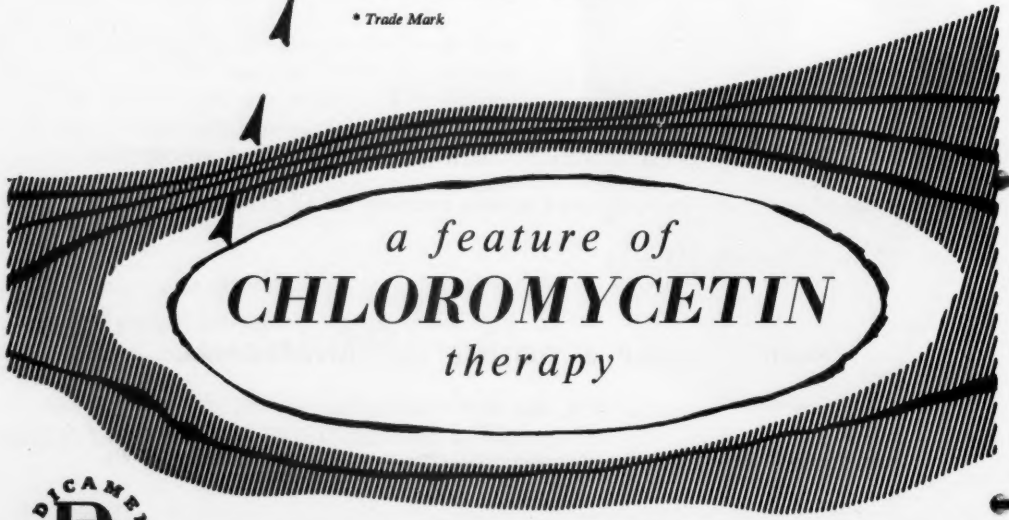
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H. A. Shapiro, B.A., Ph.D., M.B., Ch.B., F.R.S.S.Af.

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EDITORIAL · REDAKSIONEEL

THE MARRIAGE OF THE MOULDS

SYNERGISM IN ANTIBIOTICS

OLEANDOMYCIN AND TETRACYCLINE

The advent of antibiotics ushered in a new chemotherapeutic era, but these potent remedies brought their own problems in their train. Bacterial mutants resistant to the antibiotics employed emerged on a much greater scale than had been experienced with the use of drugs in the pre-antibiotic era. However, a resourceful attack on the ubiquitous mould by those skilled in an entirely new field of biochemistry soon provided alternative antibiotics, even in the wide-spectrum field. These have done much to keep most pathogenic bacteria under satisfactory control.

As all antibiotics do not act on bacteria in the same way, enhanced effects can be produced by different antibiotic combinations, or by antibiotics in combination with other appropriate classes of chemicals, e.g. PAS or the sulphonamides. The need for this therapeutic stratagem is particularly important in the management of chronic diseases which require prolonged therapy, e.g. tuberculosis. A similar problem has also been met with in the treatment of urinary tract infections, which may be particularly stubborn, especially when the infecting organism is of the Proteus group.

Equally interesting and important is the growing evidence indicating that the emerg-

DIE HUWELIK VAN DIE SKIMMELS

SINERGISME ONDER DIE ANTIBIOTICA

OLEANDOMISIEN EN TETRASIKLIEN

Die koms van die antibiotica het 'n nuwe chemoterapeutiese tydperk ingelui, maar hierdie kragtige middels het hul eie probleme met hulle meegebring. Bakteriese afwykings wat weerstand bied teen die antibiotica waarvan daar gebruik gemaak word, het op 'n veel groter skaal verskyn as wat ooit ondervind is met die gebruik van geneesmiddels in die voor-antibiotica-tydperk. Hoe dit ook sal sy, 'n vindingryke aanval op die alomteenwoordige skimmels deur diegene wat ervaring opgedoen het op 'n splinternuwe biochemiese gebied, het gou-gou alternatiewe antibiotica opgelewer, selfs in die breë-spektrum-veld. Dit het veel daartoe bygedra om bevredigende beheer oor die meeste patogeniese bakterieë uit te oefen.

Aangesien alle antibiotica nie op dieselfde manier op bakterieë inwerk nie, kan 'n verhoogde effek verkry word deur verskillende antibiotiese samestellings, of deur antibiotica in samestelling met ander geskikte chemikalieë te gebruik, bv. PAS of die sulfonamiede. Die behoefte aan so 'n terapeutiese krygslis is veral van groot belang by die behandeling van chroniese siektes wat langdurige terapie vereis, bv. tuberkulose. 'n Dergelike probleem is ook teëgekom by die behandeling van infeksies

ence of resistant mutants to a combination of synergistic antibiotics is much less than to the individual drugs themselves.

These facts may serve to allay the growing fears among clinicians as well as microbiologists about the increasing frequency of the development of resistant strains of bacteria. The rise in antibiotic-resistant strains has been attributed to the widespread use of antibiotics and concern has even been expressed that in time all the sensitive organisms may be killed off, leaving only resistant survivors. This problem is not made easier by the fact that some of the newly discovered antibiotics have displayed cross-resistance with established antimicrobial agents.[1]

Exploration of the potentialities of new antibiotics, either alone or in combination, has undoubtedly dispelled this gloomy prognostication and it seems clear that many ingenious devices are still available to master this difficulty, when it arises.

The need for increased anti-bacterial efficacy and specificity has prompted a search for enhanced activity based on the well known pharmacological phenomenon of synergism. This problem has recently been explored in studies with tetracycline and another fairly new antibiotic, oleandomycin (isolated not long ago from a species of *Streptomyces antibioticus,* and the properties of which have been worked out by Sobin *et al.*[2]).

Oleandomycin and tetracycline in a combination of 1 : 2 were found to have a true synergistic effect.

Extensive and exacting controlled investigations[3] have substantiated the claim for synergism in this antibiotic mixture. A variety of strains of *M. pyogenes* var. *aureus* resistant to many antibiotics, e.g. penicillin, streptomycin, tetracycline, oxytetracycline and chlortetracycline, was employed. Tetracycline activity was determined by the use of an oleandomycin-resistant strain and, conversely, oleandomycin activity by the use of a tetracycline-resistant strain of *M. pyogenes aureus.* In some experiments, as was to be expected, only additive effects were obtained; but when the

1. Noyes, H. B., Nagle, S. C., Sandford, J. F. and Robbins, H. L. (1956): Antibiot. Chemother., **6**, 450.
2. Sobin, B. A., English, A. R. and Celmar, W. D. (1954): *Antibiotics Annual,* pp. 827 *et seq.* New York: Medical Encyclopeadia, Inc.
3. English, A. R., McBride, T. J., van Halsema, G. and Carlozzi, M. (1956): Antibiot. Chemother., **6**, 511.

van die urinêre stelsel wat besonder hardnekkig kan wees, veral wanneer die infeksieorganisme aan die *Proteus*-groep behoort.

Ewe interessant en belangrik is die toenemende bewyse wat daarop dui dat die verskyning van afwykings wat weerstand teen 'n samestelling van sinergistiese antibiotica bied, veel minder opvallend is as in die geval van die individuele middels.

Dit is moontlik dat die steeds groter wordende vrees by kliniste sowel as mikrobioloë oor toenemende veelvuldigheid in die ontwikkeling van weerstandskragtige soorte bakterieë deur hierdie feite uit die weg geruim sal word. Die styging in die aantal soorte wat weerstand teen die antibiotica bied, is toegeskryf aan die wydverspreide gebruik van die antibiotica, en die vrees is reeds uitgespreek dat die sensitiewe organismes met verloop van tyd almal van kant gemaak sal wees en dat net die weerstandskragtige soorte dan sal oorbly. Die probleem is bemoeilik deur die feit dat sommige van die pas ontdekte antibiotica kruisweerstand getoon het vir sover dit die gevestigde mikrobe-bestrydende middels betref.[1]

'n Ondersoek van die moontlikhede van die nuwe antibiotica òf as alleenstaande middels òf in samestelling met andere het veel gedoen om hierdie mistroostige voorspellings 'n nekslag toe te dien, en dit skyn tans asof talle vindingryke middels nog beskikbaar is om hierdie moeilikheid—wanneer dit hom voordoen—te bowe te kom.

Die behoefte aan verhoogde bakterie-bestrydende doeltreffendheid en spesiwiteit was dan ook die rede waarom 'n soektog van stapel gestuur is na vermeerderde bedrywigheid, gebaseer op die bekende farmakologiese beginsel van sinergisme. Hierdie probleem is onlangs ondersoek in die loop van navorsingswerk met tetrasiklien en 'n ander betreklike nuwe antibioticum, oleandomisien (wat nie so lank gelede nie geïsoleer is van 'n soort *Streptomyces antibioticus,* en die eienskappe waarvan uitgewerk is deur Sobin *et al.*[2]).

Daar is bevind dat oleandomisien en tetrasiklien in 'n samestelling van 1 : 2 'n suiwer sinergistiese effek het.

Uitgebreide en veeleisende, gekontroleerde ondersoek[3] het die aanspraak dat hierdie antibiotiese mengsel sinergisties is, bevestig. Gebruik is gemaak van 'n verskeidenheid soorte *M. pyogenes* var, *aureus* wat weerstand teen talle antibiotica bied, bv.

1. Noyes, H. B., Nagle, S. C., Sandford, J. F. en Robbins, H. L. (1956): Antibiot. Chemother., **6**, 450.
2. Sobin, B. A., English, A. R. en Celmar, W. D. (1954): *Antibiotics Annual,* bl. 827 *et seq.* New York: Medical Encyclopeadia, Inc.
3. English, A. R., McBride, T. J., Van Halsema, G. en Carlozzi, M. (1956): Antibiot. Chemother., **6**, 511.

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antibiotics were blended according to the critical ratio aforementioned, the synergistic activity of the mixture exceeded the activity of the individual components against 7 varieties of organisms and 21 strains which were antibiotic-resistant. The investigators, in fact, appeared to have discovered a law of optimal antibiotic proportions. In a typical experiment, the protective effects of the antibiotic mixture exceeded the anticipated additive effect by as much as one-third. Analysis of the data proved that the differences were statistically significant.

The laboratory results have also been put to clinical test[4] and the interesting results obtained were reported recently by Winton and Chessrow[4] (from the Department of Medicine, Northwestern University Medical School, and the Oak Forest Infirmary of the Cook County Hospital, Oak Forest, Ill., U.S.A.).

Fifty patients were selected at random, suffering from a great variety of infections The striking and rapid response to treatment was typified by such cases as the following:

A patient with pyoderma of the scalp had been treated with all available antibiotics for a year before he was subjected to the synergistic antibiotic combination of oleandomycin and tetracycline. 'His scalp was actually floating on a lake of pus which continued to drip over his neck and face, necessitating frequent dressings. This patient was kept on two capsules four times daily for three weeks. The purulent discharge was completely controlled and the scalp healed'.

Another case with a tuberculous sinus tract had been treated with penicillin and streptomycin for 6 months with little change in the purulent drainage. After 14 days with the antibiotic combination 'all visible pus disappeared and granulation tissue became distinctly evident'.

No discussion of the ways in which antibiotics may be used should omit reference to possible side effects, as these often limit the clinical value of a drug. Winton and Chessrow[4] paid particular attention to this in their work with the oleandomycin : tetracycline combination. They noted that there were no gastro-intestinal complaints and in none of the cases was there any reason to discontinue the drug. In 3 cases 'the only side effect was a soft stool, occurring once or twice daily, but no diarrhoea. All patients who had complained of malaise or symptoms of toxemia at the outset of this study regained their sense of well being in a matter of days'.

As 96% of the mixed infections treated by

4. Winton, S. S. and Chessrow, E. (1956): A paper read at the *Antibiotic Symposium* held in Washington, D.C. in October.

penisillien, streptomisien, tetrasiklien, oksitetrasiklien en chloortetrasiklien. Tetrasiklienbedrywigheid is bepaal deur die gebruik van 'n soort wat weerstand teen oleandomisien bied, en oleandomisienbedrywigheid, andersom, deur die gebruik van 'n soort *M. pyogenes aureus* wat weerstandskragtig teen tetrasiklien is. Soos verwag, het sommige proefnemings slegs addisieresultate opgelewer; maar toe die antibiotica vermeng is ooreenkomstig die hierbogenoemde kritiese verhouding, het die sinergistiese bedrywigheid van die mengsel die bedrywigheid van die individuele middels oortref in die geval van 7 tipes organismes en 21 soorte wat weerstandskragtig teen antibiotica was. Trouens, dit skyn asof die navorsers 'n wet van die allergunstigste antibiotiese verhouding ontdek het. In 'n tipiese proefneming het die beskermende effek van die antibiotiese mengsel die verwagte addisie-effek met soveel soos eenderde oorskry. 'n Ontleding van die gegewens het aan die lig gebring dat die verskille statisties betekenisvol was.

Die laboratoriumresultate is ook aan kliniese toetse onderwerp,[4] en verslag oor die interessante resultate is onlangs gedoen deur Winton en Chessrow[4] (van die Mediese Afdeling van die Mediese Skool van die „Northwestern"-universiteit en die Oak Forest-verpleeginrigting van die Cook County-hospitaal in Oak Forest, Ill., V.S.A.).

Vyftig pasiënte wat aan 'n groot verskeidenheid van infeksies gely het, is sommer voor die voet gekies. Die opvallende en vinnige reaksie op behandeling word toegelig deur die volgende gevalle:

'n Pasiënt met piodermie van die kopvel is met al die beskikbare antibiotica behandel gedurende 'n tydperk van 'n jaar voordat daar oorgegaan is tot die gebruik van die sinergistiese antibiotiese samestelling van oleandomisien en tetrasiklien. ‚Sy kopvel het in werklikheid gedryf op 'n meer van etter wat oor sy nek en gesig afgeloop en herhaaldelike verbinding van die kopvel noodsaaklik gemaak het. Hierdie pasiënt het twee kapsules vier maal per dag gedurende 'n tydperk van drie weke gekry. Die etterafskeiding is volkome gekontroleer en die kopvel is genees.'

'n Ander pasiënt met 'n tuberkuleuse sinuskanaal is 6 maande lank met penisillien en streptomisien behandel sonder enige betekenisvolle verandering in die etterafskeiding. Na 14 dae van behandeling met die antibiotiese samestelling het ‚alle sigbare etter verdwyn en korrelweefselvorming het duidelik sigbaar geword.'

Enige bespreking van die manier waarop die antibiotica gebruik moet word, moet noodwendig 'n verwysing insluit na moontlike bykomstige effekte, want hulle lê dikwels die kliniese waarde van 'n middel aan bande. Winton en Chessrow[4] het besondere aandag hieraan bestee tydens hul navorsingswerk met die oleandomisien-tetrasiklien-samestelling. Hulle het opgelet dat daar geen spysverteringsmoeilikhede was nie, en in geeneen van die gevalle was dit nodig om behandeling met die middel te staak nie. In 3 gevalle was ‚die enigste bykomstige effek 'n sagte ontlasting wat een of twee maal per dag waargeneem is, maar geen diarree nie. Al die pasiënte wat oor 'n gevoel van onwelsyn of oor simptome van toksemie gekla het by die aanvang van die studie het hul gevoel van welsyn binne enkele dae herwin.'

4. Winton, S. S. en Chessrow, E. (1956): 'n Referaat gelewer by geleentheid van die *Simposium insake Antibiotica,* gehou in Washington, D.C., in Oktober.

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these authors were brought under clinical control with this antibiotic combination, and as there is a sound experimental basis for this therapeutic programme, it is likely that a novel and useful application of antibiotics has been brought to light. It will be of great interest to see what will still be disclosed by studies on other combinations of different antibiotics. The scope for valuable developments in this field seems almost unlimited.

(*See also p. 87*

Aangesien 96 % van die gemengde infeksies wat deur hierdie navorsingswerkers behandel is, met behulp van hierdie antibiotiese samestelling onder die knie gekry is, en aangesien daar 'n uitstekende eksperimentele grondslag vir hierdie terapeutiese program is, is dit waarskynlik dat 'n nuwe en nuttige gebruik van die antibiotica aan die lig gebring is. Ons wag met groot belangstelling op wat geopenbaar sal woord deur navorsingswerk met ander samestellings van die verskillende antibiotica. Dit skyn asof die bestek van waardevolle ontwikkelinge op hierdie gebied haas onbeperk is.

(*Kyk ook op bl. 87*)

TYMPANOPLASTY

THE SURGICAL REPAIR OF INFLAMMATORY LESIONS OF THE SOUND-CONDUCTING APPARATUS

A PRELIMINARY REPORT

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Surgery of the middle ear was for many years concerned solely with elimination of infection in an area where the risks of complications (intra-cranial, or involving the facial nerve, labyrinth or lateral sinus) were an ever-present anxiety to the attending otologist. As a result operation was necessarily radical and, if thorough, resulted in a grave degree of hearing loss, so that the patient, whilst possibly being given a dry, 'safe' ear, was left without any auditory function in it.

After many years the attico-antrostomy and similar operations were devised, in which as much as possible of the tympanic membrane and ossicles was preserved in an endeavour to keep what hearing was present, and at the same time to eliminate infection and the risk of complications. The former object was sometimes attained and, whilst complications were usually obviated, a proportion of chronically infected cavities only too often resulted.

With the advent of chemotherapeutic drugs, more particularly antibiotics, the proportion of dry cavities resulting from these modified radical mastoidectomies was appreciably raised, but few operations resulted in an improvement in hearing. One was satisfied if infection was eliminated and the hearing remained at the pre-operative level.

Improved understanding of the physiology of the sound-conducting apparatus led German surgeons[1-3] to devise operative procedures on the middle ear which endeavoured to eliminate infection whilst simultaneously repairing defects of the conducting mechanism. This improved surgical technique was rendered possible by the increased scope of antibiotics in helping to eliminate infection, and by new developments in operating microscopes, which enabled precise micro-surgery to be performed. This new surgical technique has been given the name of 'tympanoplasty' and has greatly widened the scope of aural surgery in the treatment of chronic middle ear infection and deafness. Not only can a more complete operation be performed with a greater chance of eliminating chronic middle ear sepsis, but also the so-called 'safe ear', with a dry, intermittently discharging central perforation, in which surgery was not previously indicated, can now be safely submitted to operation with a good prospect of restoring the hearing to a useful level. The hearing level often surpasses that obtained after a successful fenestration operation for otosclerosis.

RATIONALE OF TYMPANOPLASTY

The rationale of tympanoplasty rests on the following physiological facts:

1. Lack of auditory stimulus at the oval window in the scala vestibuli, due to interruption of the ossicular chain, with an intact tympanic membrane, produces a hearing loss of about 60 decibels. This factor has been established in studies of cochlear potential.[4]

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2. Fully developed stapedial fixation, with an intact drum, causes a hearing loss of about 50 decibels. Fenestration of the horizontal semicircular canal reduces this loss to 20-30 decibels. This residual loss is due to the fact that the tympanic membrane and ossicular chain are unable to exercise their function of sound-pressure transformation to the oval window. This is normally caused by the difference in mass of the drum and ossicles as compared with the relatively small oval window membrane.[5]

3. A large defect in the tympanic membrane, with an intact ossicular chain and mobile stapes, but with a round window exposed to the external air, causes a hearing loss of 40-45 decibels. Lack of sound-pressure transformation is responsible for about 25 decibel loss. The remainder is due to loss of phase differential between the oval and round windows. The sound waves tend to be neutralized in the cochlea because sound waves impinge on both windows instead of almost entirely on the oval window. On the Continent this is called expressively 'loss of sound-protection of the round window'.

4. In certain cases a membrane forms in the hypo-tympanum, thus providing sound protection of the round window, with a large defect of the drum and loss of the ossicular chain; sound-pressure transformation is lacking. The resultant hearing loss is about 30 decibels.

brane) is of no practical importance in the conduction of sound. Small perforations of the membrana tensa usually cause only slight degrees of deafness. Larger perforations cause more deafness, and if they encroach on the region of the round window, the hearing loss is greater, due to increased lack of sound protection. In even larger perforations, deafness is increased due to loss of sound-pressure transformation, and sound protection of the round window, aggravated by reflections of sound waves from the exposed promontory.

Fig. 1 illustrates hearing loss due to various lesions of the middle ear.

INDICATIONS FOR TYMPANOPLASTY

Improvement of hearing in chronic otitis media cannot be attempted unless deafness is due to loss of sound conduction. This is assessed by the difference between air conduction and bone conduction, elicited by pure-tone audiometry. However, the bone conduction curve may be lowered occasionally, in

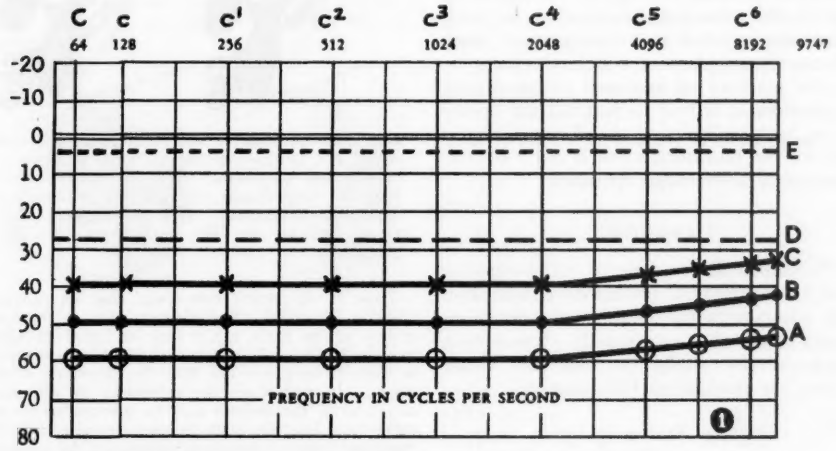


Fig. 1. Hearing loss with:
A: Defect of ossicular chain with intact drum.
B: Ankylosis of stapes.
C: Total loss of drum.
D: Sound protection of round window without sound-pressure transformation.
E: Intact drum and columella effect for sound-pressure transformation.

Hearing losses which exceed 60 decibels are due not only to a lesion of the sound-conducting mechanism, but to a superadded loss of cochlear function. This may be due to partial obstruction of both oval and round windows by scar tissue or granulations, or a superadded nerve deafness.

The membrana flaccida (Shrapnell's mem-

frequencies above 500 c/s, when both windows are obstructed, or with complete stapedial fixation. After fenestration for otosclerosis this fall in bone conduction is restored.[6] Similarly, after tympanoplasty, with cleaning of the windows, the result obtained sometimes exceeds the predicted result, because bone conduction is better than the audiogram reveals.

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In addition to information derived from audiometry, one can close a perforation with cotton wool soaked in mineral oil, or the pledget of cotton wool can be placed over the round window to produce sound-protection. The increase in hearing will be similar to the expected post-operative result. Absence of such improvement is not a contra-indication to operation, because the round window may be blocked and this lesion can be corrected during operation.

Tympanoplasty is performed for various forms of chronic otitis media, ranging from perforation of the drum without other lesions to widespread loss of drum substance, with major involvement of the tympanum, attic and antrum, including complete disorganization of the ossicular chain.

Best results can be expected after operation in dry but deaf ears. Mucoid discharge, suppuration and cholesteatoma are, however, no bar to successful results. It is desirable, by the local and systemic use of antibiotics, to reduce the amount of sepsis. Attention to sepsis of the nose and nasopharynx helps to produce dry ears and, occasionally, small doses of X-ray therapy have a beneficial effect.

In the presence of suspected or impending complications it is best to perform the operation in 2 stages, inserting the skin graft later. Fistula of the horizontal canal is not a contra-indication to a one-stage operation.

TECHNIQUE

The fundamental principle of tympanoplasty is the reconstruction of a closed tympanic cavity communicating freely with the nasopharynx through a normally functioning Eustachian tube, whilst the oval and round windows are restored to full function.[7]

TYPES OF TYMPANOPLASTY

Type 1*a*: *Myringoplasty.* In cases of a perforation of the drum which has been dry for years, or following trauma, when one feels that the tympanum, attic, etc. are free from inflammatory tissue, a relatively simple procedure suffices. Through an aural speculum or, if freer access is needed, with the addition of an endaural incision at 12 o-clock, the epithelium of the drum bordering the perforation is removed. A skin graft either split or full-thickness is placed over the denuded area and fixed in position with Spongostan, sea sponge or any other suitable material. Hearing may return to near the normal level.

Type 1*b*. In all other cases the antrum, attic and tympanum must be open for inspection, and the procedure follows the lines of the customary attico-antrostomy. It is very important that the contents of the attic be minutely observed, together with the incudo-stapedial joint, the stapes and oval window, the round window and the Eustachian orifice. Granulations and scar tissue must be meticulously removed from all these areas. As the structures are minute, it is imperative to use a good binocular operating microscope, together with specially designed instruments such as those of Zöllner or Wullstein, and very small calibre suction tubes.

The bridge is narrowed to permit inspection of the ossicular chain. If the latter is intact, the bridge is retained. The drum is prepared as before for reception of a full-thickness graft. This must be large enough to cover the perforation, narrow osseous bridge, attic and antrum. The graft is taken from the skin behind the pinna in the hair-free region. The skin here is most suitable as it is devoid of elastic fibres and retains its size and shape. In this way both sound-pressure transformation and sound-protection of the round window are restored and a normal sized tympanic cavity results. Hearing may reach to near the normal level.

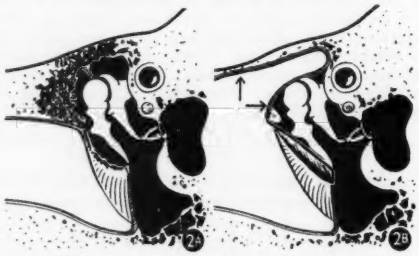


Fig. 2A. Infection of attic with intact ossicular chain, and postero-superior marginal perforation of tympanic membrane.
Fig. 2B. Attic disease removed, and preservation of annulus tympanicus. Skin graft applied. The arrows indicate the skin graft (type 1B tympanoplasty).

Type 2. Inspection may reveal that the ossicular chain is disrupted. The weakest point is the long process of the incus and it may be found in consequence that the incudo-stapedial junction is deficient as there is no connexion with the capitulum of the stapes. In such cases the remainder of the incus and head of the malleus and the osseous bridge are removed. The skin graft is made to adhere to the freshened head of the stapes, producing the so-called columella effect. Sound-pressure and protection are provided, but the tympanic cavity is smaller. Hearing may reach well above the 30 decibel level.

With large defects, one removes the epithelium from part of the promontory to provide an additional attachment for the skin graft. To prevent this graft from sinking in, a bed of Spongostan is provided in the hypo-tympanum. When this absorbs, after a few weeks, one hopes to be left with an air-containing cavity leading from the round window to an open Eustachian orifice. If removal of granulations has resulted in complete denudation of mucosa, one tries to replace the latter by a graft of mucosa from the inner aspect of the lips. Amniotic membrane has also been used, with unpredictable results.

Type 3. The stapes may be destroyed. The graft is then placed over the oval window. A slit

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is cut in the graft directly over the oval window so that the edges adhere to its margins. Sound-pressure has been lost but sound-protection of the round window restored. The hearing loss is about 30 decibels.

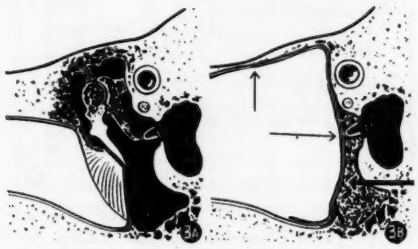


Fig. 3A. Defect of ossicular chain, with intact mobile stapes.
Fig. 3B. Reconstruction of tympanum, and skin graft applied to capitulum of stapes (columella effect). Tympanum filled with gelatine sponge (type 2 tympanoplasty). The heavy arrow indicates the gelatine sponge. The light arrows indicate the skin graft.

Type 4. In cases of a chronic adhesive process fixation of the stapes may be present. Wullstein found fixation of the stapes in 10% of all tympanoplasties.

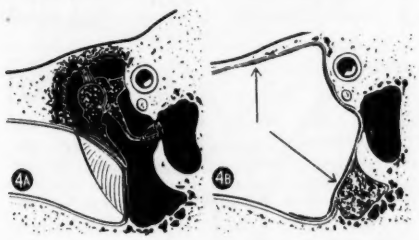


Fig. 4A. Ossicular chain disrupted and stapes destroyed.
Fig. 4B. Skin graft applied directly to the margins of the oval window (type 3 tympanoplasty). The arrows indicate the skin graft.

(*a*) If complete fixation is not present, an attempt is made to mobilize the stapedial foot plate after Rosen's method of stapes mobilization for otosclerosis.[8] Fenestration must not be performed in such cases as otherwise Tullio's syndrome results, i.e. exposure to noise causes vertigo.

(*b*) With complete stapedial fixation one can proceed to complete the tympanoplasty by a fenestration of the horizontal semicircular canal. This is best performed at a later stage, when the cavity is dry and healed.

POST-OPERATIVE TREATMENT

Antibiotics are given routinely for the first 7 days post-operatively. The first dressing is done at the end of this period and gauze or sponges are removed. Spongostan packs may be left and can be removed after 2 or 3 weeks.

Absence of aural discharge usually means that the graft is taking satisfactorily. If it is still intact after 2 weeks, it can be expected to survive.

After 3 weeks one should begin to cautiously inflate the Eustachian tube. This is repeated about 3 times weekly until one is satisfied that permanent aeration has been achieved.

RESULTS TO BE EXPECTED FOLLOWING TYMPANOPLASTY

This is a preliminary report and my series of cases is at present too small to permit statistical analysis. However, I shall describe some of my cases operated upon during the past few months. I have endeavoured to follow the principles which I saw so ably demonstrated by Professors Zöllner, Pietrantoni and Wullstein, and their assistants.

Wullstein's latest results in a series of 350 tympanoplasties, are informative. A restoration of hearing to the 30-decibel level on a pure-tone audiogram for the frequencies 500-2,000 c/s is generally accepted as rehabilitation to the social level. This is the 'social hearing' which is attained in successful fenestration operations for otosclerosis.

WULLSTEIN'S RESULTS IN 350 TYMPANOPLASTIES[9]

Type 1. Large tympanum with intact ossicular chain.

No. of Cases: 154.

15 db. loss	31.8%	76.7%.
30 db. loss	44.9%	
More than 30 db. loss	23.3%.	
(Aggravated post-operatively)	(4%).	

Type 2. Loss of ossicular chain, intact, mobile stapes.

No. of Cases: 118.

15 db. loss	15%	75%.
30 db. loss	60%	
More than 30 db. loss	25%.	
(Aggravated)	(1%).	

Type 3. Loss of ossicular chain, destruction of stapes.

No. of Cases: 37.

15 db. loss	19%	69%.
30 db. loss	50%	
More than 30 db. loss	31%.	
(Aggravated)	(2%).	

Type 4. Destruction of ossicular chain with fixation of stapes.

No. of Cases: 42.

15 db. loss	22%	84%.
30 db. loss	62%	
More than 30 db. loss	16%.	
(Aggravated)	(7%).	

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ILLUSTRATIVE CASES FROM THE AUTHOR'S SERIES

Selected cases demonstrating the results which can be obtained are summarized in Figs. 5-8.

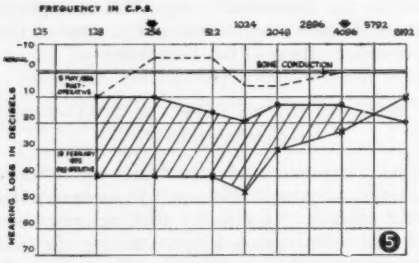


Fig. 5. Alex. C., male aged 18 years. *27 March 1956.* Tympanoplasty type 2. Large central perforation, granulations in round window and attic. Defect of long process of incus, extracted. Full-thickness skin graft covering drum remnant and capitulum stapes.
4 August 1956. New tympanic membrane intact, mobile.

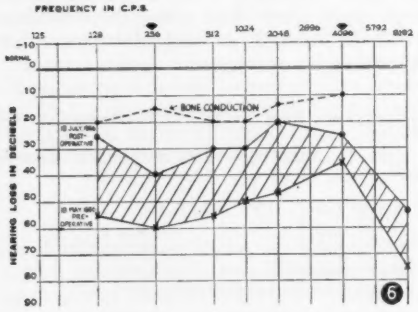


Fig. 6. Miss S. S., female aged 28 years. *25 May 1956.* Tympanoplasty type 2. Modified radical mastoid cavity (21 April 1951). Granulations in tympanum and round window. Defect long process of incus, extracted. Full-thickness graft to cover large central perforation and capitulum of stapes.
18 July 1956. New tympanic membrane intact, mobile.

SUMMARY

The operation of tympanoplasty is described.

This requires a micro-surgical technique with the aid of a binocular operating microscope.

By this means it is possible to eliminate chronic aural infection and at the same time improve the hearing and close perforations of the tympanic membrane.

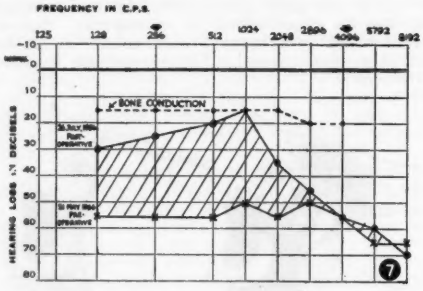


Fig. 7. Miss Daisy F., female aged 34 years. *22 May 1956.* Tympanoplasty type 2. Large central perforation. Incus extracted, long process eroded. Granulations in attic, both windows. Full-thickness graft.
2 August 1956. New tympanic membrane intact, mobile.

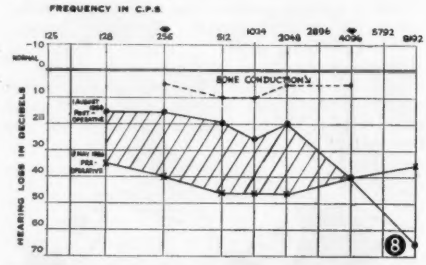


Fig. 8. Miss N. T., female aged 17 years. *18 May 1956.* Tympanoplasty type 1, large central perforation. Ossicular chain intact. Narrow osseous bridge retained. Granulations removed from attic, both windows. Full-thickness graft.
30 July 1956. New tympanic membrane intact, mobile.

OPSOMMING

Die timpanoplastiese operasie is beskryf.

Dit benodig die hulp van 'n binokulêr-opereerende mikroskoop.

Met hierdie metode is dit moontlik om chroniese oor-besmetting te verwyder en terselfdertyd die gehoor te verbeter asook deurboring van die trommelvlies toe te maak.

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STRICTURES OF THE COMMON AND HEPATIC BILE DUCTS

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Much progress has been made in the management of strictures of the bile ducts. Credit must be given to Lahey, Cattell, Allen, Cole and others for their valuable contributions to this problem. On their experience much of this work has been based.

The vast majority of strictures are 'man-made' and are the accidents of cholecystectomy. One cannot stress sufficiently the care that is necessary at the primary operation of cholecystectomy to safeguard against any injury to the ducts. Adequate exposure, good retraction, proper illumination, perfect anaesthesia and good assistants are essential. No structure should be cut in this region without its first having been identified with confidence. The

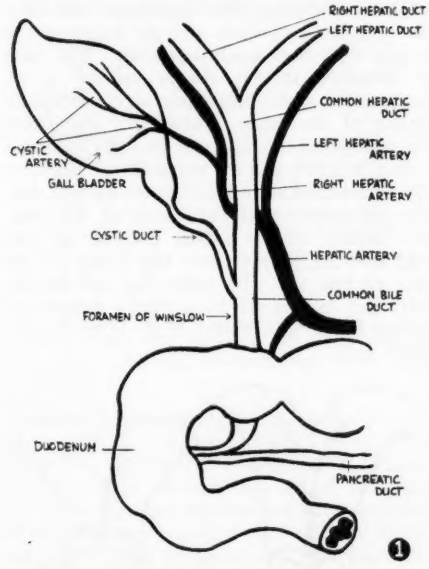


Fig. 1. Normal anatomy of the extrahepatic biliary system.

anatomy of this area is variable and any surgeon undertaking biliary surgery must be conversant with these variations (Fig. 1). The cystic duct should never be clamped and cut without dissecting out and demonstrating the T-junction of the common, hepatic and cystic ducts. One of the most frequent causes of injury is damage to the cystic artery and sudden flooding of the operative field with blood. This haemorrhage can be alarming and unless it is controlled by digital pressure on the hepatic artery (as it runs through the gastro-hepatic omentum) and a dry field obtained, blind clamping in a pool of blood may result in damage to the ducts. Once the common hepatic artery is compressed, the bleeding cystic artery can be seen and ligated.

Other causes of damage to the ducts are:

1. *Failure to Appreciate Anatomical Anomalies.* The more frequently one operates in this region, the more does one realize that the so-called normal relationship of hepatic, common and cystic ducts and their relationship to the hepatic arteries are only present in about 50% of cases. The right hepatic duct or the common bile duct may be mistaken for the cystic duct and inadvertently clamped.

2. *Mutilation of the Duct.* In exploring a normal or even a constricted duct or in the removal of stones from the duct, damage may occur which may result in fibrosis.

3. *Carelessness.* In the literature one finds frequently that even after the T-junction has been defined, it is put on tension and a clamp is placed over the kinked junction or too close to the junction (Figs. 2A, 2B).

4. *Leakage of Bile.* Leaking of bile from a stripped cystic duct may result in the pooling of bile around the ducts. Irritation due to this leads to widespread fibrosis of the extrahepatic ducts.

Incidence: The incidence of strictures of the bile ducts is difficult to assess, as only surgeons with large series report them. Grey[3] reported 700 cases from the Mayo Clinic. Waugh *et al.*[7] reported 180 operations from this clinic in 1952 with a mortality of 4.4%. Walters[6] recorded 254 personal cases from 1924-1951. Lahey and Pyrtek[4] reported 314 cases. The British literature does not contain

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series with such large numbers—Wright and Wells[8] reported 10 and 18 cases respectively. R. Maingot[5] reported 28 cases.

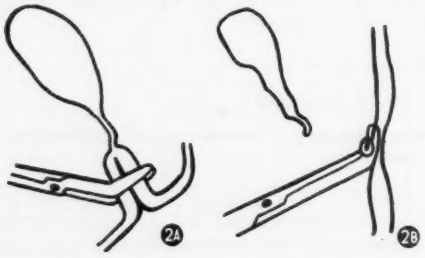


Fig. 2A. This shows the danger of kinking the common bile duct and placing the forceps across the common bile and common hepatic ducts.
Fig. 2B. The placing of the gall bladder forceps too close to the T-junction with constriction of the common bile duct.

In Lahey and Pyrtek's series[4] (the largest recorded) average age was 43.8 years. The ratio of female to male patients was 3 : 1.

Diagnosis. The most frequent symptom group is that of obstructive jaundice and in most cases there is a persistent biliary fistula.

The onset of the stricture can occur in 3 well-defined groups:

1. *Immediate onset* of a biliary fistula with the discharge of bile and a stormy convalescence.

2. *Slow and insidious onset* of jaundice after a normal convalescence. The onset can vary from a few months to several years after the operation.

3. *Rapid onset* of painless jaundice after cholecystectomy with recurrent bouts of cholangitis. These patients show all the symptoms and signs of obstructive jaundice—rapid wasting, marked icterus (progressing to a deep yellow-greenish colour), persistent pain referred to the back, and intermittent rigors. The condition has to be differentiated from an impacted stone in the common bile duct.

MATERIAL

Our experience is based on 15 cases of stricture of the extra-hepatic ducts; these have been referred to us from various sources. This series is too small from which to draw any conclusions, but we feel that certain lessons can be learnt.

Preparation. Most of our cases presented when they were extremely ill and markedly jaundiced. These patients are low in blood proteins and their liver functions are depressed. The only tests of liver function that we depend on are the urinary pigments, serum bilirubin, alkaline phosphatase and turbidity tests. The turbidity tests are more important in excluding obstruction when they are positive than when they are negative.

A careful assessment must be made, as waiting too long to get a patient fit may be as harmful as too early surgery. Delay in surgery may result in permanent cirrhosis of the liver. A useful rule is to do the minimum in a very ill patient. We have found it better to do a hepaticostomy as our first stage and then to wait 3-4 weeks until the patient is ready for a definitive procedure. This 2-stage procedure is also useful in that the liver subsides in size and more of the duct becomes available.

The patient's blood chemistry is corrected and the prothrombin index is raised by intramuscular vitamin K until it is over 80%. A high protein diet and if necessary, blood and other preparations (e.g. serum and protein hydrolysates) are given to raise the blood proteins. Glucose is given by mouth in the form of sweetened drinks.

Technique. A long transverse, supra-umbilical incision is the incision of choice and has been used in most of our cases. We have also found a right thoraco-abdominal approach useful as, on severing the diaphragm, the liver can be rotated upwards and the hilum of the liver is then more easily accessible. The mass of adhesions that is always present is approached from the right side and the hepatic flexure of the colon is mobilized and freed. The duodenum is freed on its right side and rotated medially and the portal fissure is gradually approached from the right to the left side. The identification of the stump of the common hepatic duct is usually difficult and one may have to burrow into the hilum of the liver to find it. The right and left hepatic ducts can be united by Cattell's method of cutting down the centre[1] (Fig. 3) to form a single duct.

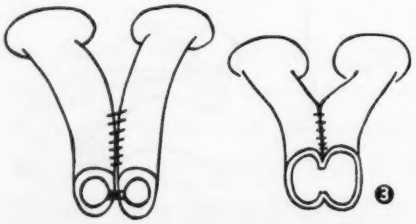


Fig. 3. Cattell's manoeuvre of converting the right and left hepatic ducts into a common duct.

The retro-duodenal and the intra-pancreatic portion of the duct always escape damage. In

order to identify the portion of the duct, the duodenum can be opened and a probe passed up the duct in order to make its dissection easy. The duct is best dissected out of the pancreas by careful diathermy of all the bleeding vessels. Unless the repair is done very soon after the original trauma, it has been our experience that the distal part of the common duct, i.e. that portion in the pancreas, contracts and makes the anastomosis with the proximal portion unsatisfactory because of the difference in size of the lumen.

Careful dissection of the hilar region is important. The dilated proximal duct is present in every case. The structures that might be damaged and have to be defined are the hepatic artery and the portal vein. The artery can be recognized by its pulsation and can be dissected free. With this safely out of the way, the dissection of the mass of fibrous tissue in the hilar region can be done with more confidence.

When the anatomy has been defined, a decision is made of the type of repair that should be undertaken. Three main choices are open to the surgeon:

1. Anastomosis of duct to duct.
2. Anastomosis of hepatic duct to duodenum.
3. Anastomosis of hepatic duct to jejunum.

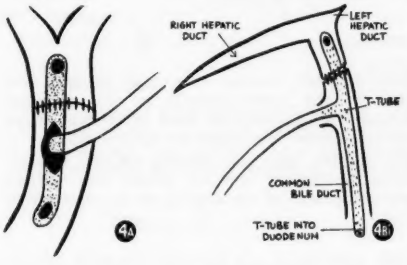




Fig. 4*A*. Method of anastomosing the duct over a T-tube.
Figs. 4*Bi*, 4*Bii*. Diagram and X-ray photographs illustrating this method. Note how close the anastomosis has been performed to the junction of the right and left hepatic ducts.

These anastomoses can be done with a splint, such as a catheter, T-tube, or vitallium prosthesis. Lahey and Pyrtek,[4] in a comprehensive article, advised the use of bouncing clay prosthesis, but this has not been available to us. We have used both vitallium splints and rubber tubes as splints and have been fortunate in that these have been passed spontaneously. Cole *et al.*[2] point out the danger of these tubes, which cannot be removed by the surgeon. They may remain *in situ* and fill up with bile salts causing a block that may require a second operation.

If a splint is necessary, it is probably best to use a T-tube which can be washed through and can be removed by the surgeon when it has served its purpose (Fig. 4). The length of time a T-tube should be left in is debatable; Cole *et al.*[2] leave it in for 3 months and Cattell[1] advocates periods up to one year. In our limited experience we have removed tubes early without further stricture formation.

When the distal portion of the duct is not available or too narrow, we have implanted the proximal portion into the duodenum. Cole and others have advocated the use of an isolated segment of the jejunum as a Roux-in-Y procedure, so as to prevent regurgitation up the common bile duct. Walters[6] states that if cholangitis develops in patients who have had strictures repaired, without exception this is the result of the contraction of the anastomosis. The symptoms are rigors or jaundice or both, associated with pain. There is no reason to believe that it is due to the reflux of food. The case illustrated here demonstrates this.

Prognosis. This depends on many factors. One of the most important is the amount of liver damage that has resulted from prolonged back pressure. If this has been present for

some time, portal hypertension may result from the biliary cirrhosis.

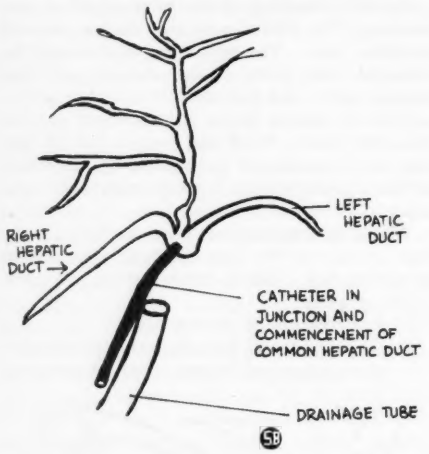
The level of the stricture is also important, as the greater the length of hepatic duct that is available, the easier the technical procedure and the more satisfactory the result.



It is important that a satisfactory repair should be done at the time of the injury or as soon after this as possible. Many of the reports in the literature stress the importance of a good anastomosis, as subsequent secondary operations are more difficult because the ducts have lost their definition and the chances of a satisfactory repair are poor.

CASE REPORT

H. C., a male aged 41, had a cholecystectomy performed on 19 July 1955. The report of the operation was that the anatomy was displayed and a cholecystectomy was performed. At the terminal stage of the operation sudden bleeding occurred and a structure was clamped, cut and ligated. His post-



Figs. 5A, 5B. A case of severed common bile duct at the commencement of the common hepatic duct, showing the level of stricture. Here an anastomosis was done to the duodenum.

Fig. 6. The same case showing the easy regurgitation of barium into the biliary tree without any symptoms of cholangitis, as no obstruction exists.

operative course was very stormy, he was profoundly shocked and disorientated and he had to be placed on a Levophed drip. This was discontinued on 23 July when he became markedly jaundiced. This became progressively worse.

On 9 August 1955, after intensive preparation, the patient was re-opened through his previous Kocher's incision. The hepatic flexure of the colon was mobilized, as well as the duodenum. Careful dissection of the hilum revealed that the common bile duct had been severed at the hilum and that the right hepatic artery had been ligated and sectioned. A catheter was inserted into the junction of the right and left hepatic ducts. The area was drained with a large tube. (Fig. 5 shows Lipiodol in the available biliary ducts). On 13 September 1955, after the patient's jaundice had subsided and his general condition had improved, it was decided to repair his bile ducts.

A long, right thoraco-abdominal incision was made. A dissection was carried out to expose the hilum of the liver again, and this was facilitated by

splitting the diaphragm and rotating the liver upwards. The distal portion of the common duct was dissected out of the pancreas, but was found to be too narrow for a satisfactory anastomosis. The proximal hepatic ducts were then inserted into the mobilized duodenum. The area was drained and the incision closed.

Post-operatively, except for some wound sepsis, the patient made an uneventful convalescence. Fig. 6 shows the anastomosis of the common duct to the duodenum. Here the barium can be seen passing freely from the duodenum into the common duct without any ascending cholangitis.

SUMMARY

1. The dangers of biliary surgery are stressed, especially the care that must be taken to protect the common bile duct.

2. The diagnosis and the preparation of these cases are considered.

3. Methods of repair of these damaged ducts are discussed, based on experience with 15 cases.

OPSOMMING

1. Die gevare van gal-chirurgie word beklemtoon—veral die sorg wat aan die dag gelê moet word om die gewone galbuis te beskerm.

2. Die diagnose en die voorbereiding van hierdie gevalle word oorweeg.

3. Metodes om hierdie beskadigde buise te herstel word bespreek aan die hand van ondervinding opgedoen in 15 gevalle.

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PERIPHERAL ARTERIAL DISEASE

CLINICAL SIGNS AND INVESTIGATIONS

J. GREENSTEIN, M.D.*

Johannesburg

'In most situations man is so over-arteried that arterial obstruction may progress unnoticed until—and perhaps suddenly—the supply of blood is reduced below minimal requirements. . . . The ideal would be to recognize ischaemia before it is clinically evident but we are still very far off from such a state.' *Learmonth.*[1]

TYPICAL HISTORIES

A patient over 40 years of age complains that for some time he has experienced a tired feeling on walking. At first this wore off, but lately (after walking a variable distance, usually several blocks) he suddenly gets a severe cramp in the foot or in the calf muscles. He has to stop for relief, which he gets almost at once or after a few seconds. Continuing his walk he experiences a recurrence of the symptoms. Walking up an incline or against a wind aggravates the symptoms and reduces the walking distance. He has noticed that one of his legs is paler and colder than the other. In cold or damp weather he has difficulty in keeping his legs warm.

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Occasionally he has a numb and tingling sensation in the feet and toes. More recently, while in bed at night, he experiences pain in the leg and finds it necessary to hang the leg out of bed for relief. Occasionally has to sit up, sleeping in a propped-up position, with the legs hanging out of bed. He has a small ulcer now which refuses to heal; the lower part of the leg and foot is cyanosed and swollen.

A second patient, a woman, complains of severe blanching of her fingers and toes, especially during winter. This hinders her domestic duties severely. She dare not put her hands in cold water. Dry or wet heat gives her relief.

A third patient, a young girl, complains of severe sweating of hands and of feet. It hinders her work as a typist or as a sales lady. She is ashamed to shake hands with friends.

XUM

Her clothes become moist (even wet) and have an unpleasant odour. Her social life is becoming intolerable.

A fourth patient complains of severe burning and itching of the feet and an inability to keep the feet under the blankets because of intolerable heat. Walking on a cold floor or immersion in cold water gives him relief.

THE PRESENTING CLINICAL SIGNS AND INVESTIGATIONS

Principles: The maintenance of a healthy limb depends on an adequate circulation, controlled by a system of vessels which vary in size and calibre from aorta to arterioles and capillaries.

An impediment to the flow of blood (whether organic or functional) will deplete an organ of its local blood needs and thus affect the metabolic activity of that organ.

We recognize 2 main forms of arterial disease:

1. Organic obstruction.
2. Vaso-motor imbalance.

The *organic group* includes all pathological conditions present in the wall of the vessel, in the lumen or compression of the lumen of the vessel from without.

The *functional group* includes all diseases in which circulatory disturbances arise from abnormal influences on the vaso-motor system.

With slow reduction in the calibre of a main vessel, new outlets must be found to accommodate the blood and to satisfy the demand of ischaemic tissue. New vessels open up which constitute a collateral system which, saves a limb from impending gangrene.

THE ORGANIC GROUP

1. *Inflammatory Diseases.*
   (a) Thrombo-angiitis obliterans (Buerger's disease).
   (b) Juvenile arteritis.
   (c) Syphilis.
2. *Degenerative Diseases.*
   (a) Arteriosclerosis.
   (b) Diabetes.
   (c) Medial calcification—Monckeberg's sclerosis.
3. *Mechanical Obstruction.*
   (a) Thrombosis.
   (b) Embolism.
   (c) External pressure.

THE FUNCTIONAL GROUP

(a) Vaso-spastic syndrome (Raynaud's phenomenon).
(b) Sympathetic over-activity (hyperhidrosis).
(c) Traumatic disease, e.g. vibrating tools.
(d) Ergot intoxication.
(e) Scleroderma.
4. *Disease Associated with Vasodilatation.*
Erythromelalgia.

SIGNS OF PERIPHERAL VASCULAR DISEASE

Inspection. A great deal of information can be obtained by inspection of the affected limb.

Colour: In the recumbent position the normal leg and foot, at ordinary room temperature, is slightly pale. If the limb is heated by immersion in warm water, it turns pink. If the patient is made to walk on bare feet, there is normally no change in colour; but if, however, one foot is definitely pale in the horizontal position or turns pale on walking or becomes unduly pale when elevated, it is an indication of depletion of the blood flow. In advanced cases it may be cadaveric. When there is intense cyanosis or pallor mixed with cyanosis, impending gangrene is threatened. If the cyanosis cannot be milked away or persists after pressure, the condition of the limb is grave. If, however, the cyanosis fades after pressure, the chances that the limb will survive is very much better. The degree of pallor, therefore, is generally a rough indication of the severity of impairment of the arterial circulation. The pallor may be uniform, patchy and may affect only one or two digits. If it is extensive, the impairment to the circulation is severe.

When the limb is placed in a dependent position after having been kept in an elevated position, normal colour should return within about 10 seconds; if pallor persists for longer, impairment to the circulation is assumed. Colour may return in a patchy manner. The more rapidly the normal colour returns, the less the impairment. When the limb is in an elevated position, the superficial and deep veins empty quickly and the veins remain in a collapsed state. When the limb is lowered and placed in a dependent position, normally the veins begin to fill from below upwards within 5-7 seconds; if this time is exceeded, it is an indication of arterial impairment. The longer it takes for the veins to fill the more severe the arterial obstruction. With varicosed, incompetent, superficial veins, however, the reflux of blood in the veins is almost instantaneous from above downwards when the limb is placed in a dependent position.

Rubor. If within a short time after the limb has been placed in the dependent position, a cyanotic redness appears along the toes and spreads upward, it indicates an impaired circulation. Here, again, the more intense the colour, the more severe is the impairment.

Skin Temperature. This depends upon the heat brought by the blood. A warm skin indicates a good flow, a cold skin a poor flow.

XUM

Stroking the skin of a limb with the dorsum of the fingers (the most sensitive part of the hand for heat) will indicate whether the limb is affected by an impaired circulation. A difference in the temperature gradient in a limb often indicates at what level the obstruction is present. It is, however, important to remember that not all cold limbs are organically impaired; other factors may create a cold extremity. Again, the state of the flow of blood in the skin need not necessarily indicate the state of flow of blood in the deeper structure. Thus the surface temperature of the skin may be quite good, yet the patient may be suffering from severe intermittent claudication.

Trophic lesions may indicate arterial obstruction. Slow healing of ulcers, if not due to neuritic conditions, is an indication of impairment of the circulation.

The Nails. In obstructive lesions these become malformed and discoloured (brown or dull grey, brittle, ridged, thick and ivory-like). The cuticle along the base of the nail is often frayed and detached from the nail itself.

Hair. The presence or absence of hair on the toe or foot is important. If hair is present in the presence of ischaemia, the circulatory condition is quite fair. Naide[2] observes that the presence of hair on toes is of prognostic significance. Its presence in a limb with impending gangrene indicates that conservative treatment should be continued and that the chances of recovery are quite good.

Sogginess of the skin between toes is an indication of dermophytosis. Paraesthesia of the skin is often encountered. Hyperaesthesia may be associated with marked circulatory impairment and if pain is elicited when the skin is touched lightly with the fingers or with cotton wool, ischaemic neuritis is present. On the other hand, hypoaesthesia is also often an indication of arterial insufficiency.

Oedema. This may be due to such causes as venous or lymphatic obstruction, or diffusion of fluid in the tissues.

The differential diagnosis will be discussed when the venous and lymphatic systems are dealt with; but oedema associated with arterial disease is often due to prolonged rest and immobility of the limb in a dependent position for relief of pain.

Occasionally one palpates a thrill in a limb, and can auscultate a murmur. This may be associated with either an aneurysm, arteriovenous fistula or collaterals following an occlusion of an artery by thrombosis. On the whole one can associate a systolic murmur with an aneurysm or thrombotic occlusion, and a continuous murmur (systolic and diastolic, with systolic accentuation) with an arterio-venous fistula (Fig 1).

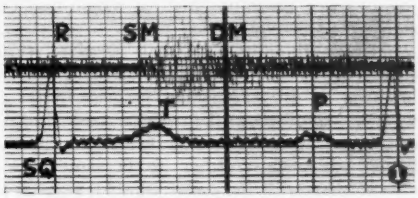


Fig. 1. *Phonocardiogram.*
The E.C.G. is a reference tracing.
S.M. = Systolic murmur.
D.M. = Diastolic murmur.

Atrophy of Muscles. This may be associated with arterial disease or due to forced inactivity. Calluses are often encountered on weight-bearing areas and if these are of long duration they indicate arterial insufficiency.

Arterial Pulsations. It is important to remember that the examiner often feels his own pulse. The question arises, when does one feel the patient's arteries and when one's own? To avoid such a mistake, one can compare the radial pulse of the patient with the pulse felt in the limb, or request a colleague to feel and count the radial pulse while the examiner compares it with the pulsations found in the limb. If the rate is equal and the pulses synchronous, then it is obvious that the pulse felt in the limb is that of the patient.

Often one encounters visible pulsations and tortuous vessels. These are evidence of arteriosclerotic arteries. Generally the femoral, popliteal, posterior tibial and dorsalis pedis arteries are examined. The popliteal artery is often very difficult to palpate. The method of palpation is well described by Allen, Barker and Hines[3] in their book on peripheral arterial diseases, and the reader is advised to consult the relevant chapter.

Pulsation in an artery need not necessarily mean that the distal and terminal arterioles are not impaired. In diabetes, e.g. where the atheromatous condition is patchy, the dorsalis pedis artery may be full and bounding and yet gangrene may be present.

THROMBO-ANGIITIS OBLITERANS (BUERGER'S DISEASE)

The signs associated with thrombo-angiitis obliterans may be somewhat different from those of arteriosclerosis. The condition often starts at the distal part of the limb; hence the

complaint is often of cramp-like pain in the sole on walking. This may spread upwards later to the calf and higher. Associated with this (and often preceding it) there is, in about 50% of cases, thrombo-phlebitis which may be extensive or patchy. When patchy it is known as phlebitis migrans, i.e. small areas of vein become involved. These areas are red, have a dull ache or are exquisitely tender. After a short period of about 1-6 weeks these thrombotic segments subside and heal, and shortly another patch starts either in the same vessel at some distant point or in another vein in a different part of the limb or in another extremity. As nerves are involved in the pathological process (artery, vein and nerve being bound together) pain involving an extensive area, not necessarily corresponding to the distribution of a particular nerve, is present. It may be paroxysmal or constant and often agonizing in severity.

The microscopic features are illustrated in Figs. 2 and 3

Oedema is a very common sign. It is due to 3 factors:

i. Venous obstruction by phlebitis in the deep veins causing an increase in intra-capillary pressure;

ii. Inactivity and dependency which again increases intra-capillary pressure;

iii. Toxic products injuring the capillary wall and producing permeability.

Trophic changes from diminution in the blood supply to the skin are often encountered. Thus the first indication of obliterative arterial disease may be when a bacterial or fungus infection is found in a fissure between the toes; after a minor operation, e.g. removal of an ingrowing toe nail; or after paring a corn or callus (the area thus injured refusing to heal); or further spread of infection and ulceration. An ulcer in this condition is moist, deep, inflamed and extremely painful, unlike the arterio-sclerotic ulcer which is generally dry, superficial and not so tender.

RAYNAUD'S SYNDROME

This condition is generally noted in women and is usually symmetrical, being present chiefly in both hands and both feet. Cold or emotional upset is an important precipitating factor. Numbness, blanching and finally cyanosis may be the symptoms complained of. Relief is obtained by heat. Scleroderma often follows. The signs associated with it are a tightly stretched and smooth skin, the natural folds disappearing and the face becoming almost mask-like, the lips thin and somewhat cyanotic and the mouth unable to open wide. Swallowing may be difficult. Calcinosis, i.e. deposits of calcium, is frequently encountered in the skin over joints, on the ears and on the tips of the fingers.

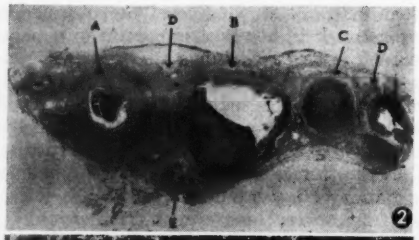




Fig. 2. *Thrombo-angiitis Obliterans* (*section from mid-thigh*).

A. *Femoral artery*: Partial occlusion by recent organizing thrombus. Note concentric arrangement of thrombus and hypertrophied media.

B. *Femoral vein*: Partial occlusion with organized thrombus. Note eccentric thrombosis.

C. A small artery occluded with recent organizing thrombus. Note hypertrophied media.

D. Small, thick-walled but patent vessels contributing a well established collateral circulation in a matted intervascular dense mass of fibrous tissue.

E. Nerve (H. and E. stain).

Fig. 3. *Organizing Thrombus.*

A. Internal elastic layer, intact.

B. Histiocyte loaded with haemosiderin pigment.

C. Media, hypertrophied, intact and infiltrated with cells.

D. Numerous thick-walled vessels constituting canalization.

TRAUMATIC VASO-SPASTIC DISEASE

Also known as 'pneumatic hammer disease' this is often encountered in men working with vibrating tools. It may occur in one hand only. The signs are similar to those of Raynaud's disease. Unless the occupation is changed in time, before permanent damage is done, the condition may become irreversible and progressive.

XUM

ERYTHROMELALGIA

In this condition hot, painful feet or palms are complained of. The intolerance to heat is such that the patient has to keep his feet out from under the blankets. Immersion of feet or hands in cold water or walking with bare feet on the cold floor gives relief. There is marked redness of the skin, which feels hot; all the pulses are bounding.

HYPERHIDROSIS

Profuse sweating of hands and feet is often encountered in young people. It may be so profuse that the condition becomes intolerable. This is often associated with acrocyanosis in which the hands and feet are deep blue or there is a mottling appearance known as livido reticularis. The skin is very cold to the touch.

(*To be continued*)

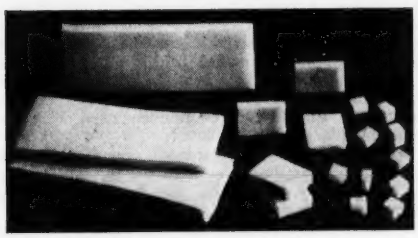
PREPARATIONS AND APPLIANCES

SPONCAL

A NEW HIGHLY ABSORBENT NON-IRRITANT MATERIAL, ESPECIALLY DEVELOPED FOR SURGERY

Sponcal is a white, highly purified cellulose product of fine spongy structure, whereas cotton and cotton products, e.g. gauze, are natural cellulose.

Sponcal has an unsurpassed absorptive capacity, taking up fluids 20 times its own dry weight within a very short time. When dry the sponge is hard and stiff. On moistening it swells and becomes soft and flexible. To achieve this soft flexibility the material need only take up approximately its own dry weight of fluid. The greatest part of its absorptive capacity is thus left.



Sponcal is supplied in dry form and *compressed*, its bulk thus being reduced to one-fourth of its wet volume. The compressed sponge swells rapidly and vigorously when placed in water. Dried, it resumes the same volume as before compression.

Sponcal can be tagged for identification with metal plaques. It is sterilized by autoclaving or by boiling.

Sponcal, moist or dry, is readily cut into various sizes and shapes.

Application: *Sponcal* must be used *moist*. When dry, the sponge is moistened with sterile water, saline or, if desired, with some aqueous disinfectant. Excess fluid should be squeezed out (not wrung out).

Swabs: For use as swabs, pieces of appropriate size are cut. It is merely necessary to press lightly against the bleeding area. A clean field is thus immediately obtained. When saturated with blood the sponge is rinsed and squeezed a few times in a basin of sterile water. As the same sponges may be used during the course of the operation, the consumption of material is very small (4-6 sponge compresses 1 x 7 x 9 cm. as against 30-50 ordinary gauze swabs). The nurse is furthermore released from the enervating task of keeping count of great numbers of swabs.

Abdominal Pads: As abdominal pads *Sponcal* is a soft and flexible yet firm material, and thus particularly appropriate for isolating operative areas (in walling off bowel). The material is available in various sizes or is readily cut into sizes and shapes appropriate for every operation. *Sponcal* cannot break and no threads can come loose.

Protective: The *Sponcal* cloth may also be used as a soft bedding when abdominal organs, such as intestines and stomach, are delivered on to the abdominal wall.

Sponcal may be used to protect sensitive tissues by placing *Sponcal* between the tissues and the retractor (e.g. the liver at gall bladder operations).

Absorbent Dressings: On heavily exuding wounds and biliary, small bowel or bladder fistulae, a slightly moistened *Sponcal* cloth may be applied, and is also recommended for use in cleansing the skin pre-operatively.

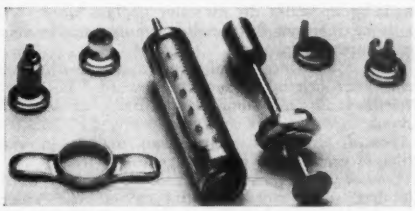
There have been no indications of tissue irritation in the clinical tests made.

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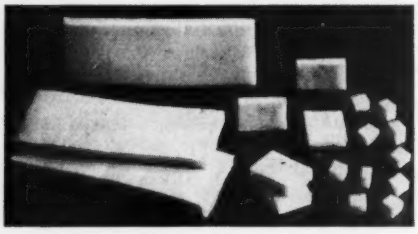
PREPARATE EN TOESTELLE

SPONCAL

'N NUWE, HOOGS ABSORBERENDE, NIE-PRIKKELENDE STOF WAT SPESIAAL VIR CHIRURGIE ONTWIKKEL IS

Sponcal is 'n wit, hoogs gesuiwerde sellulose-produk met 'n fyn, sponsagtige struktuur. Daarenteen is katoen en katoenprodukte, bv. gaas, natuurlike sellulose.

Sponcal het 'n ongeëwenaarde absorpsievermoë, en neem vloeistowwe, 20 keer swaarder as sy eie droë gewig, binne 'n baie kort tydjie op. As die spons droog is, is dit hard en styf. As dit nat word, swel dit op en word sag en plooibaar. Om hierdie sagte plooibaarheid teweeg te bring, is dit vir die stof slegs nodig om ongeveer sy eie droë gewig aan vloeistof op te neem. Die oorgrootste deel van sy absorpsievermoë bly dus oor.



Sponcal word in 'n droë vorm en *saamgepers* beskikbaar gestel. M.a.w., die massiwiteit daarvan word verminder tot een-vierde van sy vogtige volume. Die saamgeperste spons swel vinnig en kragdadig op sodra dit in water geplaas word. As dit droog is, neem dit dieselfde volume aan as voor die saampersingsproses.

Sponcal kan met behulp van metaalplaatjies vir identifikasiedoeleindes geëtiketteer word. Dit word gesteriliseer in 'n stoomdruk-sterilisator of deur dit te kook.

Sponcal, droog of vogtig, kan maklik in verskillende groottes en fatsoene geknip word.

Aanwending: *Sponcal* moet *vogtig* gebruik word. Die droë spons word bevogtig met steriele water, 'n soutoplossing, of, indien verkies, met die een of ander waterige ontsmettingsmiddel. Die oortollige vloeistof moet uitgedruk—nie uitgewring word nie.

Deppers: Vir gebruik as deppers word stukkies van 'n geskikte grootte uitgeknip. Al wat nodig is, is om liggies teen die bloeinde plek te druk. 'n Skoon veld word dus dadelik verkry. As die spons al die bloed opgeneem het wat dit kan word dit uitgespoel in 'n bak steriele water, en 'n paar keer uitgedruk. Aangesien dieselfde sponse in die loop van 'n operasie gebruik kan word, is die materiaalverbruik besonder klein (4-6 sponsomslae, 1 x 7 x 9 sm., teenoor 30-50 gewone gaasdeppers). Daarbenewens word die verpleegster onthef van die ontsenuende taak om 'n groot aantal deppers te tel.

Buikkussinkies: As buikkussinkies is *Sponcal* 'n sagte, plooibare en tog stewige stof. Dit is dus veral geskik vir die afsondering van operasiegebiede (vir die afbakening van ingewande). Die stof is verkrygbaar in verskillende groottes, en kan maklik geknip word in die groottes en fatsoene wat vir elke operasie nodig is. *Sponcal* kan nie breek nie, en daar is geen drade wat kan lostrek nie.

Vir beskermingsdoeleindes: Die *Sponcal*-doek kan ook gebruik word as 'n sagte onderlaag wanneer buikorgane soos die ingewande en maag teen die buikwande geplaas word.

Sponcal kan gebruik word om gevoelige weefsels te beskerm deur die *Sponcal* tussen die weefsels en die oophouer te plaas (bv. die lewer in galblaasoperasies).

Absorberende verbindsels. 'n Effens vogtige *Sponcal*-doek kan aangelê word op wonde wat heelwat vog afskei, en op gal-, dunderm- of blaasfistels. Dit word ook aanbeveel vir die reiniging van die vel voor 'n operasie.

Die kliniese toetse wat uitgevoer is, het geen bewys van weefselprikkeling opgelewer nie.

Enigste Suid-Afrikaanse Verspreiders: Lennon Bpk., Posbus 39, Kaapstad.

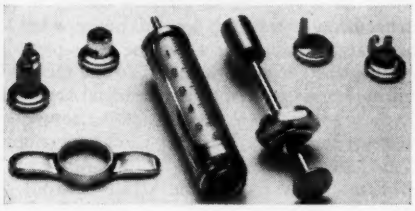
OORSPRONKLIKE STANDAARD-50-ONDERHUIDSPUIT

Die ideale oplossing van die probleem wat deur glasmetaalspuite opgelewer word, is verskaf deur die ontwikkeling van die nuwe Switserse Standaard-50-onderhuidspuit.

Dit kan, ten volle inmekaargesit, of nadat dit uitmekaar gehaal is, gesteriliseer word deur enige standaardsterilisasiemetode teen temperature van soveel soos 200° C.

Die suier wat van vleklose staal gemaak is, is aan hoegenaamd geen slytasie onderhewig nie. Geen

spoor van metaal word dus ooit in die kamer aangetref nie. Die suier is gemaak van 'n enkele stuk,



sonder enige gleufies of vere. Die ophoping van vuilis onder die veer van die konvensionele spuit word dus voorkom. Om te verhinder dat die suier ten gevolge van swaartekrag op- of afgly, is 'n vlottende veer aangebring in die doppie waardeur die suierstang loop.

Weens die selfrigtende ontwerp, pas dit styf selfs wanneer die skroefdoppie net liggies vasgeskroef is.

Daar is geen plekke wat moeilik of onmoontlik is om te bereik nie. Skoonmaakwerk word dus vergemaklik, en niks bly agter nie.

Die gradering is onuitwisbaar, en die gestandardiseerde dele is volkome verwisselbaar, grootte vir grootte.

Die verskillende soorte neusstukke en toebehore wat beskikbaar is, maak dit die ideale spuit vir veelvuldige doeleindes.

In geval van breekskade kan 'n spaar glasloop onmiddellik aangebring word, en die spuit is dan weer eens gereed vir oombliklike gebruik.

Enigste Suid-Afrikaanse Verspreiders: Lennon Bpk., Posbus 39, Kaapstad.

SUPPLEMENTARY EDITORIAL

AVAILABILITY OF ANTI-POLIOMYELITIS VACCINE IN SOUTH AFRICA

The medical profession will strongly endorse the decision of the Minister of Health to investigate obtaining 250,000 doses of anti-poliomyelitis vaccine from the United States,* to overcome the critical shortage which has developed in the Union because of the inability of our own Poliomyelitis Research Foundation to keep pace with the ever-growing demand for this vaccine. The Minister's decision will end an irritating period during which the profession was feeling increasingly frustrated in its attempts to immunize those who sought vaccine protection against poliomyelitis.

In making his decision, the Minister apparently acted on the advice of Mr. G. W. Cook, Chairman of the Board of Trustees of the Poliomyelitis Research Foundation, and Dr. E. H. Cluver, a distinguished expert and technical adviser to the Board of Trustees. The Minister has therefore very properly abandoned the view which he expressed as recently as December 1956, when he stated that 'it was felt that the Union would soon be in a position to meet all its requirements'.† The supply position, in fact, got worse and not better.

It has become clear that the South African resources available for manufacturing anti-poliomyelitis vaccine cannot at present be expected to cope with the situation and the decision to supplement domestic production will be welcomed and commended throughout the country by the medical profession as well as the lay public.

The U.S.A. Bureau of Foreign Commerce will only permit the export of vaccine to a government as a consignee, and as the vaccine can be air-freighted, there should be no further delay in the receipt and distribution of adequate supplies of anti-poliomyelitis vaccine to inoculate all those at risk.

The American vaccine is produced under extremely rigorous conditions imposed by the United States authorities and has been proved safe and effective.

It is clear from evidence which has accumulated both overseas and in this country, that the epidemiological pattern of poliomyelitis has altered profoundly. Not only is the incidence of the infection in the older age groups steadily on the increase, but the almost complete immunity which the Bantu population has enjoyed until recently, has virtually disappeared. It has therefore become obsolete and poor preventive medicine to concentrate an immunization programme on children under 6 in the first place, particularly as clinical experience has created a conviction that the disease is extremely grave when it attacks older age groups, especially adults.

This country has been in the grip of severe outbreaks of poliomyelitis almost continuously for the last 2 or 3 years, and the infection has not been confined strictly to the summer months. In some parts of the country it has extended well into the winter period.

In all these circumstances, and in view of the ready availability of large supplies of the vaccine from America, our immunization programme should now be directed at all age groups in the population. We are certainly no

* *The Star*, 30 January 1957.
† *Rand Daily Mail*, 6 December 1956.

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longer justified in permitting any obstruction which may prevent all those who wish to be inoculated, from being immunized. Indeed, in Denmark the inoculation programme has been extended to include everybody up to 40 years of age; and we understand that President Eisenhower is personally sponsoring a campaign for the inoculation of American citizens up to the age of 40.

As it is now possible to obtain in a single order from America almost as much as the total amount of vaccine we have been able to issue so far since the local vaccine began to be released, every effort should be made to have anti-poliomyelitis vaccine freely available. It is known that 7,000,000 doses were available for export from the U.S.A. in the last quarter of 1956. As recently as December last year, over a million doses were exported from the U.S.A. to Sweden and half-a-million doses were imported by the Canadian Government to supplement their domestic output. We are therefore in the same position as Canada and there would appear to be no good reason why the Union should not receive from the United States all the vaccine its population needs for a complete and effective immunization programme.

The Minister's decision to supplement our precarious locally produced supplies will thus ensure that no gaps will arise in our immunization programme and will preserve for the doctor and the patient the important principle of a free choice of drug.

The imported vaccine will diminish the severe strain on our local resources, both for domestic needs, and for countries to our north. This, in turn, will release our scientific manpower for the important task of concentrating on fundamental research in the virus field, which should clearly be the primary objective of a Poliomyelitis Research Foundation. It would be a regrettable state of affairs if the prosecution of research were to be impeded by the heavy demands of a routine mass-production undertaking, more suited to the facilities, skill and experience of pharmaceutical organizations, who have made the manufacture of vaccine their normal day-to-day business. These organizations, with their enormous resources, can ensure the steady output of adequate quantities of vaccine which conform with the stringent requirements of the American Public Health authorities and should make it increasingly unnecessary for us to burden the South African Poliomyelitis Research Foundation with commercial demands with which it must, in the nature of things, be difficult for a Research Foundation to comply.

We understand that the cost of the imported vaccine will hardly differ from that charged at present to private practitioners for the South African product. Indeed, if the Government were to assist matters by waiving import duties, it may be possible to supply the vaccine at an even cheaper rate. On all grounds, therefore, the decision of the Minister will be acclaimed throughout the country.

It is to be hoped that the South African Poliomyelitis Research Foundation will not have to become dependent for its operations on the manufacture and sale of its anti-poliomyelitis vaccine. The time has come when both the Government and the public can be expected to give strong additional financial support to the Foundation so that it can pursue fundamental research into improved forms of the vaccine, whether it is to be given by injection or to be taken by mouth.

CORRESPONDENCE

MUSCLE RELAXANTS AND ANAESTHETIC MORTALITY

To the Editor: I have read with interest your Editorial comment upon *Muscle Relaxants and Anaesthetic Mortality* in your issue of 5 January. It contains a statement which recent events would suggest is misleading and which has apparently slipped past your Editorial blue pencil.

You state that 'Apart from specific drugs, adequate artificial respiration carried out for the required time is the *completely* effective antidote to unduly prolonged action of the relaxants'.

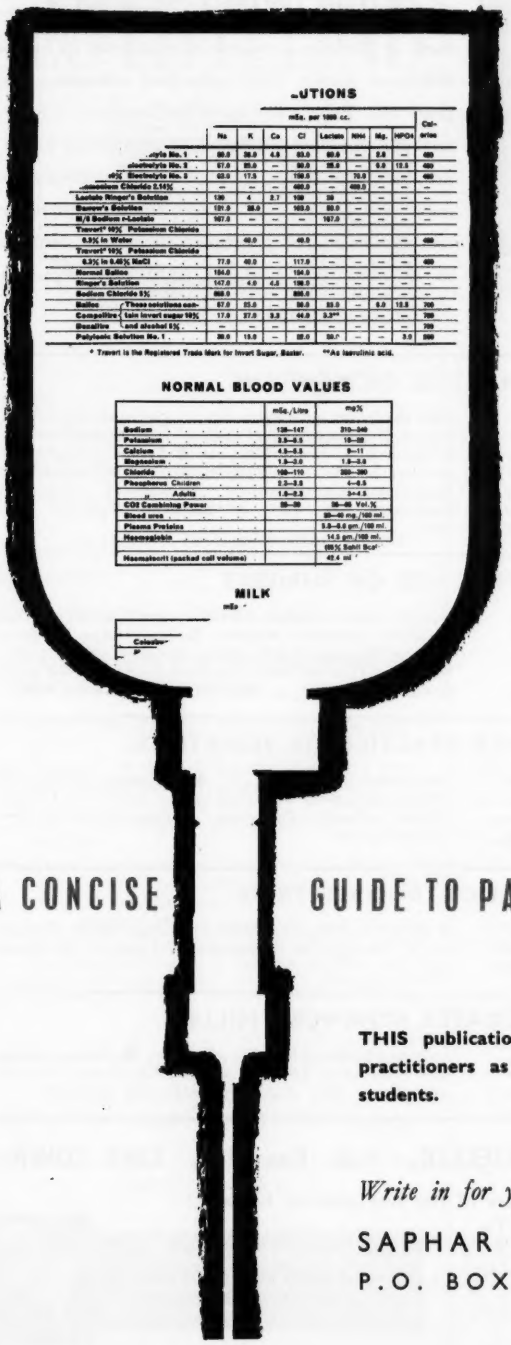
If, Sir, you have followed the correspondence in recent issues of the *British Medical Journal* following on the issue of 20 October 1956, which contained an article by Dr. A. R. Hunter on *Neostigmine-Resistant Curarization*, you will be aware that a variety of authors have reported a total of some 15 deaths in patients who were given relaxants and who never again breathed adequately despite 'specific drugs' and 'adequate artificial respiration carried out for the required time'. Some of the correspondents, moreover, state emphatically that the nature of death suggested a cardiovascular failure.

Yours is an unenviable task, Sir, and the demands of the printing trade make it necessary to prepare material well in advance of publication; but I am sure that you will hasten to correct the assertion about completely effective antidotes to curarization.

C. S. Jones,
Head of the Department.

Department of Anaesthesia,
Groote Schuur Hospital,
Observatory, C.P.

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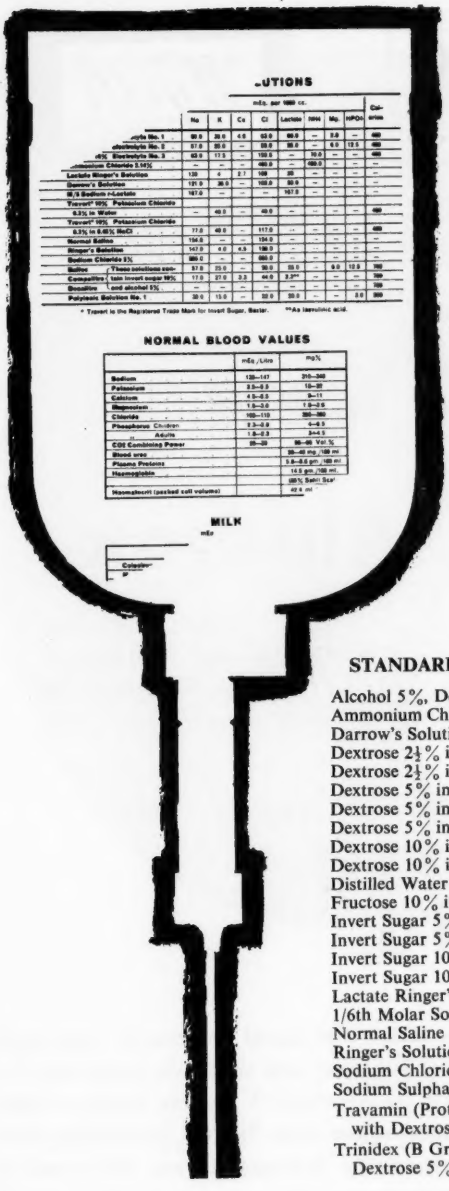
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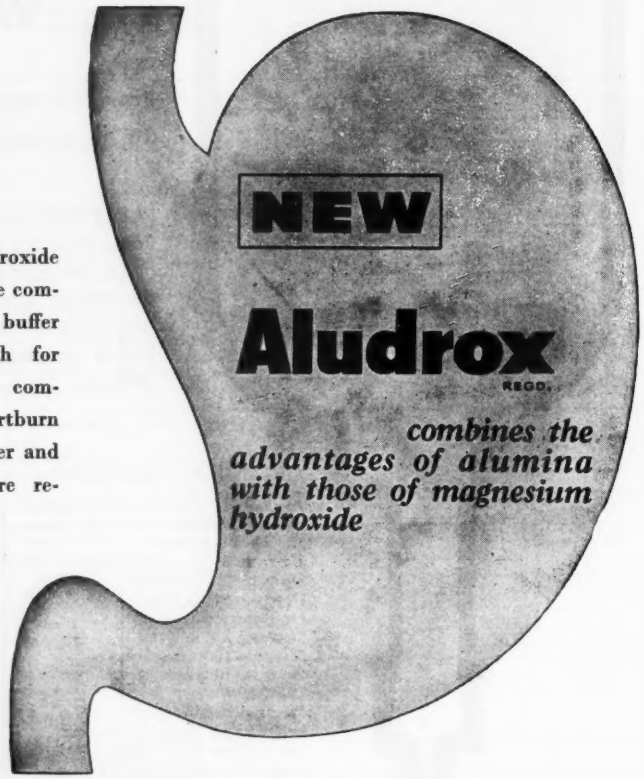
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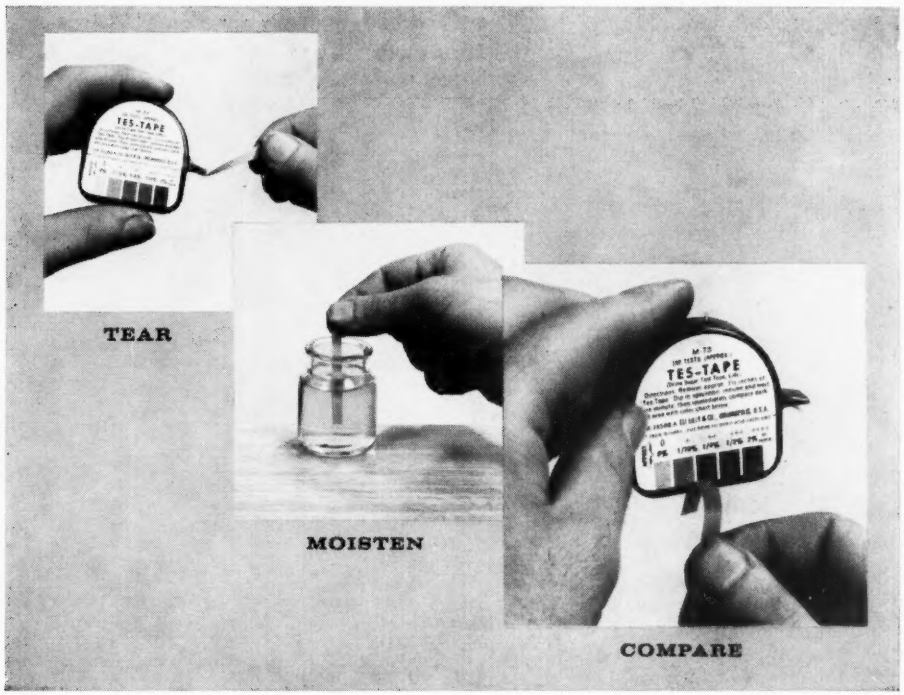


* **Now also available in extremely palatable tablet form.**
Bottles of 50 Tablets.
Suspension: **Bottles of 6 and 12 fluid ounces.**

ALUDROX combines the logical magnesium compound, familiar cream of magnesia, with aluminium hydroxide in a ratio supported in the literature.[1,2,3] Rossett[1] found in studies with such a combination that "in the proportions used (four parts of aluminium hydroxide to one part cream of magnesia by volume), few patients noted change in bowel habit".

Aludrox REGD.

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urine sugar test of unmatched simplicity

'Tes-Tape'

(URINE SUGAR TEST TAPE, LILLY)

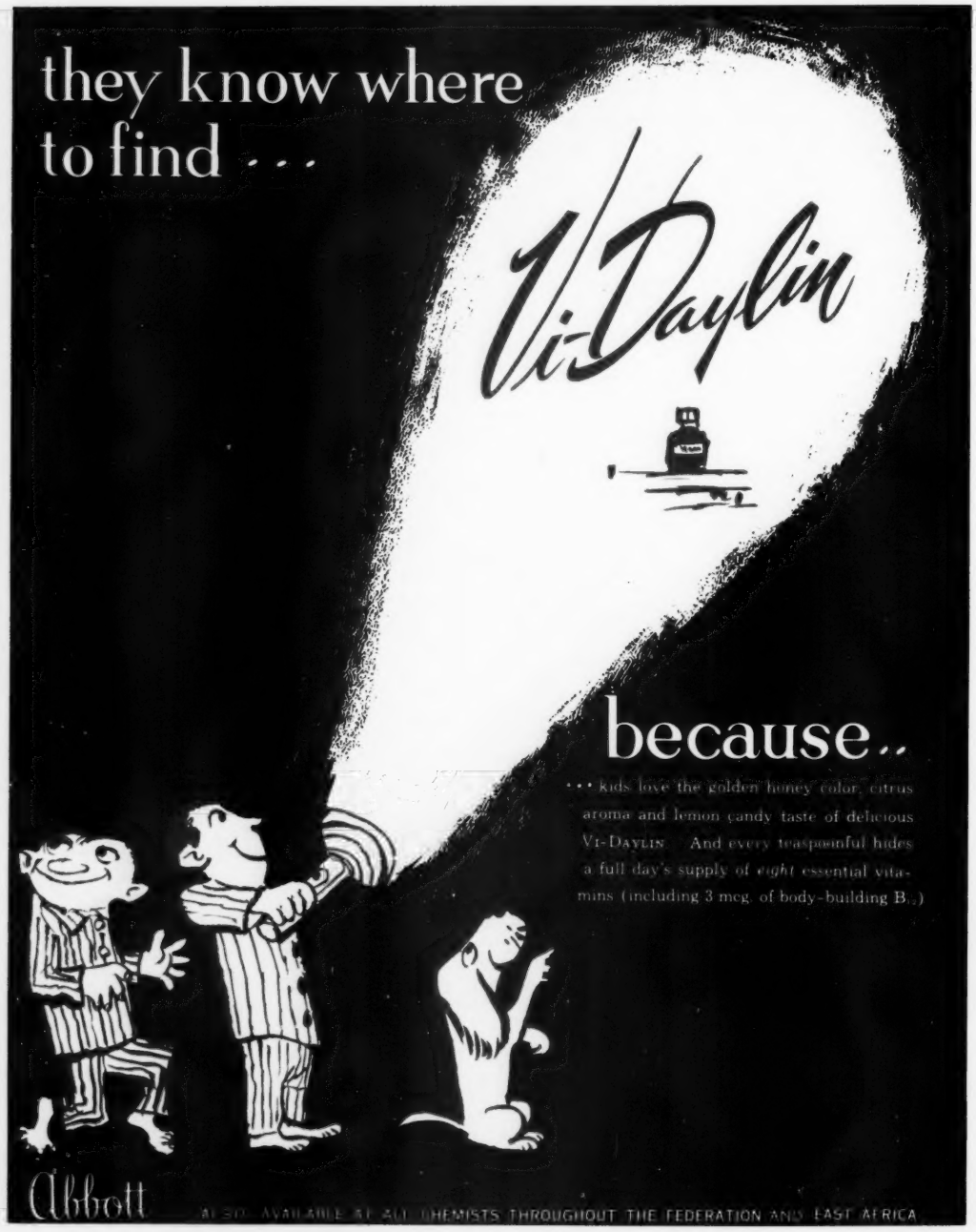
'Tes-Tape' completely eliminates the need for test tubes, heat, reagents, or any other paraphernalia in quantitative urine sugar determinations. Simply moisten a strip of 'Tes-Tape' with the specimen. After just sixty seconds, compare it with the color chart on the 'Tes-Tape' dispenser. Then read off the percentage of sugar. The selective action of 'Tes-Tape' prevents false positive reactions, assures complete accuracy.

The convenient size of the 'Tes-Tape' dispenser permits you to carry it on house calls for on-the-spot determinations. Your patients also will welcome the convenience, simplicity, and accuracy of 'Tes-Tape.'

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